APPENDIX 1

GLOSSARY

ACCELERATING PUMP—A device in the carburetor that supplies an additional amount of fuel, temporarily enriching the air-fuel mixture when the throttle is suddenly opened

ACCELERATION—The process of increasing velocity. Average rate of change of increasing velocity, usually in feet per second.

AIR BLEED—An opening into a gasoline passage through which air can pass (or bleed) into the gasoline as it moves through the passage.

AIR CLEANER—A device mounted on the engine through which air must pass before entering the combustion chamber. A filtering device in the air cleaner removes dust and dirt particles from the air.

AIR-COOLED ENGINE—An engine cooled by air circulating between cylinders and around cylinder head.

AIR FILTER—A filter through which air passes, and which removes dust and dirt particles from the air.

AIR-FUEL RATIO—The ratio between the volume of air and the volume of fuel used to establish a combustion mixture.

AIR-INJECTION SYSTEM—A system which injects air into the exhaust manifold or thermal reactor so that the combustion of the carbon monoxide and unburned hydrocarbons in the exhaust gases can be completed.

AIR POLLUTION—Contamination of the air by natural and manufactured pollutants.

AIR PRESSURE—Atmospheric pressure (14.7 pounds per square inch at sea level) or pressure of air produced by pump, by compression in engine cylinder, and so on.

ALLOY—A mixture of two or metals, usually produced to improve characteristics of the base metal.

ANCHORED PISTON PIN—A stationary wrist pin secured to the piston at the bosses that allows the connecting rod to move about the pin.

ATDC —After top dead center.

ANTIFREEZE—A substance added to the liquid-cooled engine to prevent freezing.

ANTIFRICTION BEARING—Type of bearing in which moving parts are in rolling contact; ball, roller, or tapered roller bearing.

ANTIKNOCK—Refers to substances that are added to gasoline to decrease the tendency to knock when the air-fuel mixture is compressed and ignited in the engine cylinder.

ATOMIZATION—The spraying of a liquid through a nozzle so that the liquid is broken into tiny globules or particles.

AUTOMATIC CHOKE—A choke that operates automatically in accordance with certain conditions, usually temperature and intake manifold vacuum.

BABBIT—An antifriction metal lining used as a wearing surface for bearing to reduce the friction between moving components.

BACKFIRING—Pre-explosion of air-fuel mixture so mat explosion passes back around the opened intake valve and flashes back through the intake manifold.

BACK PRESSURE—The resistance of gases to flow through a system.

BAFFLE—A plate or shield to divert the flow of liquid or gas.

BALL-CHECK VALVE—A valve consisting of a ball and seat. Fluid can pass in one direction only; it is checked by the ball seating on the seat.

BBDC—Before bottom dead center.

BDC—Bottom dead center; the position of the piston when it reaches the lower limit of travel in the cylinder.

BEARING—A mechanical component that supports and aligns the location of another rotating or sliding member.

BIMETAL—Referring to the thermostatic bimetal element made up of two different metals with different heat expansion rates; temperature change produces a bending or distorting movement.

BLOCK—*See* CYLINDER BLOCK

BLOW-BY—Leakage of the compressed air-fuel mixture or burned gases from combustion, passing piston and rings, and into the crankcase.

BLOWER—A mechanical device for compressing and delivering air to the engine at higher than atmospheric pressure.

BOILING POINT—The temperature at which a liquid boils.

BOOST PRESSURE—The pressure in the intake manifold while the turbocharger is operating.

BORE—The diameter of a cylinder. Also used to describe the process of enlarging or accurately refinishing an engine cylinder.

BRAKE HORSEPOWER—The power actually delivered by the engine that is available for driving the vehicle.

BTDC—Before top dead center.

BUSHING—A replaceable lining for a hole in which a shaft, rod, or similar part moves.

BUTTERFLY—The choke or throttle valve.

BYPASS—A separate passage that permits a liquid to take a path other than that normally used.

CALIBRATION—(l) Balancing: The setting of the delivery of an injection system or the setting of the rack pointer on a single unit pump in relation to predetermined positions of a quantity control member. (2) Adjustment: Fixing fuel delivery and speed adjustments to specified engine requirements.

CAM-GROUND—A process by which the piston is ground slightly egg-shaped and, when heat becomes round.

CAMSHAFT—The shaft in an engine that has a series of cam lobes for operating the valve mechanism.

CAMSHAFT PUMP—An injection pump containing a camshaft to operate the pumping element or elements.

CARBON—A substance deposited on engine parts by the combustion of fuel. Carbon forms on pistons, rings, valves, and so on, inhibiting their action.

CARBON DIOXIDE—A gas resulting from burning fuel.

CARBON MONOXIDE—A colorless, odorless, tasteless, deadly gas found in engine exhaust, formed by incomplete burning of hydrocarbons.

CARBURETION—The action that takes place in the carburetor: converting liquid fuel to vapor and mixing it with air to form a combustible mixture.

CARBURETOR—The device in a gasoline fuel system that mixes air and fuel and delivers the combustible mixture to the intake manifold.

CATALYTIC CONVERTER—A device used on the exhaust system of gasoline engines to reduce harmful emissions.

CETANE—Ignition quality of diesel fuel. A high-cetane fuel ignites more easily (at lower temperature) than a low-cetane fuel.

CFM—Cubic feet per minute.

CHOKE—A device in the carburetor that chokes off, or reduces, the flow of air into the intake manifold; producing a partial vacuum in the intake manifold and a consequent richer air-fuel mixture.

CID—Cubic inch displacement.

CLOSED CRANKCASE VENTILATING SYSTEM—A system in which the crankcase vapors are discharged into the engine intake system and pass through the engine cylinders rather than being discharged into the air.

CLOSED NOZZLE—A nozzle incorporating either a poppet valve or a needle valve, loaded in order to open at some predetermined pressure.

COMBUSTION—The rapid burning of the air-fuel mixture in the cylinder.

COMBUSTION CHAMBER—The space at the top of the cylinder and in the head where combustion of the air-fuel mixture takes place.

COMPRESSION—The act of pressing into a smaller space or reducing in size or volume by pressure.

COMPRESSION RATIO—The ratio between the volume in the cylinder with the piston at bottom dead center and with the piston at top dead center.

COMPRESSION RINGS—The upper rings on a piston; the rings designed to hold the compression in the cylinder and prevent blow-by.

COMPRESSION STROKE—The piston stroke from bottom dead center during which both valves are closed and the gases in the cylinder are compressed.

CONCENTRIC—Having a common center, as circles or spheres, one within the other.

CONNECTING ROD—Linkage between the crankshaft and piston, usually attached to the piston by a piston pin and to the crank journal on the crankshaft by a split bearing and bearing cap.

CONTROL PINON—A collar engaging the plunger and having a segment of gear teeth, integral or attached, which mesh with the control rack.

CONTROL RACK—A toothed rod inside mechanical injection pumps that rotates the pump plunger to control the quantity of fuel injected.

COOLANT—The liquid that circulates in an engine cooling system that reduces heat generated by the engine.

COOLING FAN—The fan in the engine cooling system that provides a forced circulation of air through the radiator or around the engine cylinders so that cooling is affected.

COOLING PINS—The thin metal projections on the air-cooled engine cylinder and head that greatly increases the heat-radiating surfaces and helps provide cooling of engine cylinder.

COOLING SYSTEM—A system that reduces heat generated by the engine and thereby prevents engine overheating, including liquid-cooled engines, engine water jackets, radiator, and water pump.

CRANKCASE—The lower part of the engine that serves as a housing for the crankshaft.

CRANKSHAFT—The main rotating member or shaft of the engine that converts rotary motion into reciprocating motion.

CYCLE—A series of events with a start and finish during which a definite train of events takes place.

CYLINDER—A hollow tube that contains the actions of combustion gases and the piston in an internal combustion engine.

CYLINDER BLOCK—The part of the engine to which and in which other engine parts and accessories are attached or assembled.

CYLINDER HEAD—The part of the engine that encloses the cylinder bores; contains water jackets (on liquid-cooled engines) and valves (on I-head engines).

CYLINDER SLEEVE—A pipe-shaped removable insert used as the cylinder wall on some engines.

DASHPOT—A device that controls the rate at which the throttle valve closes.

DEAD CENTER—Either of the two positions when the crank and connecting rod are in a straight line at the end of the stroke.

DELIVERY VALVE—A spring loaded valve which opens at some predetermined pressure to permit fuel flow from the injector plunger and bushing spray tip.

DETERGENT—A chemical sometimes added to the engine oil, designed to help keep the internal parts of the engine clean by preventing the accumulation of deposits.

DETONATION—In the engine, excessively rapid burning of the compressed charge which results in engine knock.

DIESEL ENGINE—An engine using the diesel cycle of operation; air alone is compressed and diesel fuel is injected before the end of the compression stroke. Heat of the compression produces ignition.

DIESEL FUEL—A light oil sprayed into the cylinders of a diesel engine near the end of the compression stroke.

DIESELING—A condition in which a spark-ignition engine continues to run after the ignition is off; caused by carbon deposits or hot spots in the combustion chamber glowing sufficiently to furnish heat for combustion.

DIPSTICK—*See* OIL-LEVEL GAUGE.

DISPERSANT—A chemical added to oil to prevent dirt and impurities from clinging together in lumps that could clog the engine lubrication system.

DISTRIBUTOR PUMP—An injection pump where each metered delivery is directed to the appropriate engine cylinder by a distributing device.

DOHC—Double overhead camshaft.

DRIBBLE—Insufficiently atomized fuel issuing from the nozzle at or immediately following the end of main injection.

DRIVABILITY—The general operation of a vehicle, usually rated from good to poor; based on characteristics of concern to the average driver, such as smoothness of idle, even acceleration, ease of starting, quick warm-up, and not overheating.

ECCENTRIC—Off center.

EMISSION CONTROL—Any device or modification added to or designed into a motor vehicle for the purpose of reducing air-polluting emissions.

ENERGY—The ability or capacity to do work.

ENGINE—A machine that converts heat energy into mechanical energy.

ETHYLENE GLYCOL—A solution added to antifreeze to help prevent freezing.

EVAPORATIVE CONTROL SYSTEM—A system that prevents the escape of fuel vapors from the fuel tank or air cleaner while the engine is off. The vapors are stored in a charcoal canister or in the engine crankcase until the engine is started.

EXHAUST EMISSIONS—Pollutants emitted into the atmosphere through any opening downstream of the exhaust ports of an engine.

EXHAUST-GAS ANALYZER—A device for sensing the amounts of air pollutants in the exhaust gas of a motor vehicle.

EXHAUST-GAS RECIRCULATION (EGR) SYSTEM—An NO_x control system that recycles a small part of the inert exhaust gas back through the intake manifold to lower the combustion temperature.

EXHAUST MANIFOLD—The part of the engine that provides a series of passages through which burned gases from the engine cylinders may flow to the muffler.

EXHAUST PIPE—The pipe connecting the exhaust manifold to the next component in the exhaust system.

EXHAUST STROKE—When the exhaust gases from the cylinder are removed via the exhaust valves.

EXHAUST SYSTEM—The system that collects the exhaust gases and discharges them into the air. Consists of the exhaust manifold, exhaust pipe, muffler, tail pipe, and catalytic converter (if required).

EXHAUST VALVE—The valve that opens to allow the burned gases to escape from the cylinder during the exhaust stroke.

EXPANSION TANK—A tank connected by a hose to the filler neck of an automobile radiator; the tank provides room for heated coolant to expand and to give off any air that may be trapped in the coolant.

F-HEAD—A type of engine with the valves arranged to form an F; one valve is in the head, the other in the cylinder block.

FAN—The bladed device in back of the radiator that rotates to draw cooling air through the radiator or around the engine cylinders.

FAN BELT—A belt (or belts), driven by the crankshaft, whose primary purpose is to drive the engine fan and water pump.

FIRING ORDER—The order in which the engine cylinders deliver their power strokes.

FLOAT BOWL—In the carburetor, the reservoir from which gasoline feeds into the passing air.

FLOAT LEVEL—The float position at which the needle valve closes the fuel inlet to the carburetor to prevent further delivery of fuel.

FORCE—The action of one body on another tending to change the state of motion of the body acted upon. Force is usually expressed in pounds.

FOUR-STROKE CYCLE ENGINE—An engine that requires four piston strokes (intake, compression, power, exhaust) to make a complete cycle of events in the engine cylinder.

FRICTION—The resistance to motion between two bodies in contact with each other.

FRICTION BEARING—A bearing having no moving parts. The shaft that rotates simply rubs against or rides on a thin film of oil between the bearing and shaft.

FUEL—The substance that is burned to produce heat and create motion of the piston on the power stroke of the engine.

FUEL FILTER—A device located in the fuel system that removes dirt and other contaminates from the fuel passing through.

FUEL GAUGE—The gauge that indicates to the operator the height of the fuel level in the tank.

FUEL INJECTION—A fuel delivery system that sprays fuel either directly into the cylinders or into the intake manifold just ahead of the cylinders.

FUEL INJECTION TUBING—The tube connecting the injection pump to the nozzle holder assembly.

FUEL INJECTOR—A device in a diesel engine fuel system for injecting fuel into the cylinder.

FUEL LINE—The pipe or tube through which fuel travels from the tank to other components within the fuel system.

FUEL PUMP—The electrical or mechanical device in the fuel system which forces fuel from the fuel tank to the carburetor or fuel injection system.

FUEL PUMPHOUSING—The main casing into or to which are assembled all the components of the injection pump, and may accommodate the camshaft in the case of camshaft pumps; or the camshaft or driveshaft in the case of distributor type pumps.

FUEL TANK—The metal tank that serves as a storage place for fuel.

FULL-FLOATING PISTON—A piston pin free to turn in the piston boss of the connecting rod eye.

FULL THROTTLE—Wide-open throttle position with accelerator pressed all the way down to the floorboard

GASOLINE—A liquid blend of hydrocarbons, obtained from crude oil; used as the fuel in most automotive engines.

GASOLINE ENGINE—An engine having its piston driven by the explosions of a mixture of air and gasoline vapor ignited by an electric spark

GASTIGHT—Constructed or arranged so that gas will not enter or escape an enclosed space under specified conditions.

GEAR TRAIN—A drive mechanism consisting of a group of gear that mesh together to operate an engine and its accessories.

GLOW PLUG—A small electric heater installed in the precombustion chamber of diesel engine to preheat the chamber for easier starting in cold weather.

GOVERNOR—A device that controls, or governs, another device, usually on the basis of speed or load.

HEAT-CONTROL VALVE—In the engine, a thermostatically operated valve in the exhaust manifold; diverts heat to the intake manifold to warm it before the engine reaches normal operating temperature.

HONE—A tool/process for enlarging cylinders or cylinder lines to precise tolerances; also used for controlling finishes.

HORSEPOWER—A measure of a definite amount of power; 550 foot-pound per second.

HYDRAULIC GOVERNOR—A mechanical governor having a hydraulic servo-booster to increase output force.

HYDRAULIC HEAD ASSEMBLY—The assembly containing the pumping, metering, and distributing elements (and may include the delivery valve) for distributor-type pumps.

HYDRAULIC VALVE TAPPET—A valve tappet that, by means of hydraulic pressure, maintains zero valve clearance so that valve noise is reduced.

HYDROCARBON (HC)—A compound containing only carbon and hydrogen atoms, usually derived from fossil fuels such as petroleum, natural gas, and coal; an agent in the formation of photochemical smog. Gasoline is a blend of liquid hydrocarbons refined from crude oil.

HYDROGEN (H)—A colorless, odorless, highly flammable gas whose combustion produces water; the simplest and lightest element.

HYDROMETER—A device to determine the specific gravity (roughly the heaviness) of a liquid. This determination indicates the freezing point of the coolant in the cooling system.

I-HEAD—A type of engine with the valves located in the cylinder head.

INDICATED HORSEPOWER—A measurement of engine power based on power actually developed in the engine cylinders.

IDLE-MIXTURE SCREW—The adjustment screw (on some carburetors) that can be turned in or out to lean or enrich the idle mixture.

IDLE SPEED—The speed, or rpm, at which the engine runs when the accelerator pedal is fully released and there is no load on the engine.

IGNITION-COMPRESSION—When the heat generated by compression in an internal combustion engine ignites the fuel (as in a diesel engine).

IGNITION-SPARK—When the mixture of air and fuel in an internal combustion engine is ignited by an electric spark (as in a gasoline engine).

IGNITION TIMING—Refers to the timing of the spark at the spark plug as related to the piston in the engine cylinder.

INJECTION/IGNITION—When the piston nears the top of its stroke, fuel admitted under pressure is sprayed into the cylinder. The fuel ignites due to the heat in the cylinder.

INJECTION PUMP—The device which meters the fuel and delivers it under pressure to the nozzle and holder assembly.

INJECTION PUMP ASSEMBLY—A complete assembly consisting of the fuel pump proper, together with additional units such as governor, fuel supply pump, and additional optional devices, when these are assembled with the injection pump to form a unit.

INJECTION TIMING—The matching of the pump timing mark, or the injector timing mechanism, to some index mark on an engine component, such that injection will occur at the proper time with reference to the engine cycle.

INJECTOR—The mechanism, including nozzle, that injects fuel into the engine combustion chamber on diesel engines.

IN-LINE ENGINE—An engine in which the cylinders are arranged in one straight line.

IN-LINE PUMP—An injection pump with two or more pumping elements arranged in line, each pumping element serving one engine cylinder only.

INTAKE MANIFOLD—That component of the engine that provides a series of passages to allow the air-fuel mixture to flow to the engine cylinders.

INTAKE STROKE—The piston stroke from top dead center to bottom dead center during which the intake valve is open and the cylinder receives a charge of air-fuel mixture.

INTAKE VALVE—The valve in the engine that is opened during the intake stroke to permit the entrance of the air-fuel mixture into the cylinder.

INTERNAL COMBUSTION ENGINE—An engine in which the fuel is burned inside the engine, as opposed to an external combustion engine where the fuel is burned outside the engine, such as a steam engine.

JOURNAL—Serves as the point of support and the center of rotation for the shaft. That part of the shaft that is prepared to accept a bearing (connecting rod, main bearing).

KNOCK—A heavy metallic engine sound that varies with engine speed; usually caused by a loose or worn bearing; name also used for detonation, pinging, and spark knock. See DETONATION.

L-HEAD—A type of engine with the valves located in the cylinder block.

LAP—To work two surfaces together with abrasive until a very close fit is produced; to polish.

LASH—The clearance or play between adjacent movable mechanical parts. See VALVE LASH.

LEAN MIXTURE—A air-fuel mixture that has a high proportion of air and a low proportion of fuel.

LUBRICATION SYSTEM—The system in the engine that supplies the engine with lubricating oil to prevent contact between any two moving metal surfaces.

MANIFOLD—A device with several inlet or outlet passageways through which a gas or liquid is gathered or distributed. See INTAKE MANIFOLD and EXHAUST MANIFOLD.

MECHANICAL EFFICIENCY—In an engine, the ratio between brake horsepower and indicated horsepower.

MECHANICAL GOVERNOR—A speed sensitive device of the centrifugal type, which controls the injection pump delivery sole by mechanical means.

MICROMETER—A measuring device that measures accurately such dimensions as shaft or bore diameter or thickness of an object.

MICROPROCESSOR—The small, on-board solid-state electronic device that acts as the central processing unit. Sensors provide input information which the microprocessor uses to determine the desired response (in any) as an output signal.

MUFFLER—In the exhaust system, a device through which the exhaust gases must pass and which reduces the exhaust noise.

MULTIPLE-POINT INJECTION—A gasoline fuel injection system in which only air enters the intake manifold. As the air approaches the intake valve, an injection valve opens in the intake port, spraying fuel into the airstream. Also called port injection.

MULTIPLE-VISCOSITY OIL—An engine oil that has a low viscosity when cold (for easier starting) and a higher viscosity when hot (to provide adequate engine lubrication).

NEEDLE VALVE—A small, tapered, needle-pointed valve that can move into or out of a seat to close or open the passage through it. Used to control the fuel level in the carburetor float bowl.

NITROGEN (N)—A colorless, tasteless, odorless gas that constitutes 78 percent of the atmosphere by volume and is a part of all living substances.

NITROGEN OXIDES (NO_x)—Any chemical compound of nitrogen and oxygen; a basic air pollutant. Automotive exhaust emissions levels of nitrogen oxides are limited by law.

NOZZLE—The opening or jet, through which fuel or air passes as it's discharged. Also, the assembly of parts employed to atomize and deliver fuel to the engine.

NOZZLE AND HOLDER ASSEMBLY—The complete apparatus which injects the pressurized fuel into the combustion chamber.

NOZZLE TIP—The extreme end of the nozzle body containing the spray holes.

OCTANE RATING—A measure of the antiknock properties of gasoline. The higher the octane rating, the more resistant the gasoline is to spark knock or detonation.

OIL—A liquid lubricant, usually made from crude oil and used for lubrication between moving parts.

OIL CLEARANCE—The space between the bearing and the shaft rotating within it.

OIL CONTROL RINGS—The lower ring or rings on a piston; designed to prevent excessive amounts of oil from working up into the combustion chamber.

OIL COOLER—A small radiator that lowers the temperature of oil flowing through it.

OIL FILTER—A filter that removes impurities from the engine oil passing through it.

OIL GALLERY—A pipe or drilled passageway in the engine used to transport oil from one area to another.

OIL-LEVEL GAUGE—The dipstick that is removed and inspected to check the level of the oil in the crankcase of an engine.

OIL PAN—The lower part of the crankcase in which a reservoir of oil is maintained.

OIL-PRESSURE INDICATOR—A gauge that indicates (to the operator) the oil pressure in the lubricating system, or a light that comes on if the oil pressure drops too low.

OIL PUMP—A device that forces oil from the oil pan to the moving parts of an engine.

OIL SLINGER—A device mounted to a revolving shaft such that any oil passing that point will be thrown outward where it will return to the point of origin.

OVERHEAD CAMSHAFT—A camshaft located in the cylinder head where the cam lobes are in direct contact with the rocker arms.

OXYGEN—A colorless, tasteless, odorless, gaseous element that makes up about 21 percent of the air. Capable of combining rapidly with all elements except the inert gases in the oxidation process called burning.

PARTICLE—A very small piece of metal, dirt, or other impurity which may be contained in the air, fuel, or lubricating oil used in an engine.

PASSAGE—A small hole or gallery in an assembly or casting through which air, coolant, fuel, or oil flows.

PCV VALVE—The valve that controls the flow of crankcase vapors in accordance with ventilation requirements for different speeds and loads.

PETROLEUM—The crude oil from which gasoline, lubricating oil, and other such products are refined.

PHOTOCHEMICAL SMOG—Smog caused by hydrocarbons and nitrogen oxides reacting photochemically in the atmosphere. The reactions take place under low wind velocity, bright sunlight, and an inversion layer in which the air mass is trapped Can cause eye and lung irritation

PING—Engine spark knock or detonation that occurs usually during acceleration. Caused by excessive advance of ignition timing or low-octane fuel.

PISTON—A cylindrical plug that slides up and down in the cylinder and is joined to the connecting rod.

PISTON BOSS—The reinforced area around the piston-pin bore.

PISTON CROWN—The top or head of the piston.

PISTON DISPLACEMENT—The volume of air moved or displaced by the piston as the piston moves from BDC to TDC.

PISTON HEAD—The portion of the piston above the top ring.

PISTON LANDS—The spaces in the piston between the ring grooves.

PISTON PIN-A cylindrical pin that passes through the piston bore and joins the connecting rod to the piston.

PISTON RING—A split ring (expansion type) placed in a groove of the piston to seal the space between the piston and the cylinder wall.

PISTON-RING END GAP—The clearance between the ends of the piston ring.

PISTON-RING GROOVE—The grooves cut in the piston into which the piston rings are fitted.

PISTON-RING SIDE CLEARANCE—The clearance between the side of the ring and the ring lands.

PISTON SKIRT—The portion of the piston that is below the piston bore.

PISTON STROKE—The distance that a piston moves between its limits of travel.

POLLUTANT—Any substance that adds to the pollution of the atmosphere. In a vehicle, any such substance in the exhaust gas from the engine or escaping from the fuel tank or air cleaner.

POSITIVE CRANKCASE VENTILATION (PCV)—A crankcase ventilation system; uses intake manifold vacuum to return the crankcase vapors and blow-by gases to the intake manifold to be burned, thereby preventing their escape into the atmosphere.

POWER—The rate of doing work or the rate for expanding energy. The unit for mechanical power is horsepower.

PRONY BRAKE—A device using a friction brake to measure horsepower.

PRECISION INSERT BEARING—A precision type of bearing consisting of an upper and lower shell.

PRECOMBUSTION CHAMBER—In some engines, a separate small combustion chamber where combustion begins.

PREIGNITION—Ignition of the air-fuel mixture in the combustion chamber by some unwanted means, before the ignition spark occurs at the spark plug.

PRESSURE—The amount of force distributed over each unit of area. Pressure is expressed in pounds per square inch (psi), inches of mercury, and other units.

PRESSURE CAP—A radiator cap with valves which causes the cooling system to operate under pressure at a higher and more efficient temperature.

PRESSURIZE—To apply more than atmospheric pressure to a gas or liquid.

PSI—Pound per square inch; usually to indicate pressure of a liquid or gas.

PUSHRODS—A special rod used to transit the motion of the cam and the lifter to the rocker on the cylinder head.

RADIAL ENGINE—An engine with each cylinder located on a radius of a circle and with all cylinders disposed around a common crankshaft.

RADIATOR—In the cooling system, the device that removes heat from coolant passing through it; receives hot coolant from the engine and sends the coolant back to the engine at a lower temperature.

RADIATOR CAP—The cap placed on the radiator filler neck.

RATIO—The value obtained by dividing one number by another, indicating their relative proportions.

RECIPROCATING—Moving back and forth; as a piston reciprocating in a cylinder.

RELIEF VALVE—A valve that opens when a preset pressure is reached. This relieves or prevents excessive pressure.

REVOLUTION—A term to describe a 360° circular motion of the crankshaft.

RICH MIXTURE—An air-fuel mixture that has a low proportion of air and a high proportion of fuel.

ROCKER ARM—A device that rocks or pivots on the rocker arm shaft as the cam rotates, causing the valve to open.

ROCK POSITION—The piston and connecting rod position (top or bottom dead center) at which the crank can rock or rotate a few degrees without appreciable movement of the piston.

ROD CAP—The lower part of a connecting rod that can be taken off by removing bolts or nuts so the rod can be detached from the crankshaft.

SAE—Society of Automotive Engineers.

SCAVENGING-A cleaning or blowing out action in reference to exhaust gases.

SEMIFLOATING PISTON PIN—A piston pin in which the ends of the pin are free to move in the piston bearings of the bosses.

SHROUD—A hood placed around an engine fan to improve air flow.

SLEEVE METERING—A system of metering fuel delivery by incorporating a movable sleeve with which port opening and/or port closing is controlled.

SMOG—A term coined from the words "smoke" and "fog." First applied to the foglike layer that hangs in the air under certain atmospheric conditions; generally used to describe any condition of dirty air and/or fumes or smoke.

SOHC—Single overhead camshaft.

SPILL VALVE—A valve used to end injection at a controllable point on the pumping stroke by allowing fuel to escape from the pumping chamber.

SPRING RETAINER—The piece of metal that holds the valve spring in place, and is itself locked in place by the valve spring retainer locks.

STATIONARY PARTS—The main parts of an engine that do not move, but provide support

STROKE—The movement, or the distance of the movement, in either direction, of the piston travel in an engine.

SUPERCHARGER—In the intake system of the engine, a pump that pressurizes the incoming air or air-fuel mixture. This increases the amount of fuel that can be burned, increasing engine power. If the supercharger is driven by the engine exhaust gas, it is called a turbocharger.

SUPPLY PUMP—A pump for transferring the fuel from the tank and delivering it to the injection pump.

TANK SENDING UNIT—A device in the fuel tank that provides indication of fuel level for instrument panel gauge.

TDC (TOP DEAD CENTER)—The position of a reciprocating piston at its uppermost point of travel.

TEMPERATURE INDICATOR—A gauge that indicates to the operator the temperature of the engine coolant, or a light that comes on if the coolant gets too hot.

THERMAL EFFICIENCY—The ratio between the power output and the energy in the fuel burned to produce the output.

THERMOSTAT—A device for automatic regulation of temperature; usually contains a temperature-sensitive element that expands or contracts to open and close off the flow of air, a gas, or a liquid.

THERMOSTATIC SWITCH—A switch that is turned on or off by temperature change.

THRUST—A force tending to push a body out of alignment, A force exerted endwise through a member upon another member.

THRUST BEARING—Bearing that limits the axial (longitudinal) movement of the shaft.

TIMING DEVICE—A device responsive to engine speed and/or load to control the timed relationship between injection cycle and engine cycle.

TORQUE—A force that produces a turning or twisting effort; measured in pound-feet.

TORQUE CONTROL—A device which modifies the maximum amount of fuel injected into the engine cylinders at speeds below rated speed to obtain the desired torque output.

TURBOCHARGER—An exhaust driven compressor that forces air into the engine.

TWO-STROKE CYCLE ENGINE—An internal combustion engine requiring but two piston strokes to complete the cycle of events that produce power.

UNIT FUEL INJECTOR—An assembly which receives fuel under supply pressure and is then actuated by an engine mechanism to meter and inject the charge of fuel to the combustion chamber at high pressure and at the proper time.

UNIT PUMP—An injection pump containing no actuating mechanism to operate the pumping element or elements.

VALVE—A mechanism that can be opened or closed to control or stop the flow of a liquid, gas, or vapor from one space to another.

VALVE-ACTUATING MECHANISM—A group of parts that work together to receive power from the drive mechanism (camshaft) and transmit that power to the engine valves.

VALVE GUIDE—A hollow shaft pressed into the cylinder head to keep the valve in proper alignment.

VALVE LASH—Clearance between the top of the valve stem and the valve-lifting mechanism.

VALVE LIFT—The distance a valve moves from the fully closed to the fully open position

VALVE OVERLAP—The period of crankshaft rotation during which both the intake and exhaust valves are open. It is measured in degrees.

VALVE REFACING MACHINE—A special machine used to resurface the face and extend the life of a valve.

VALVE RETAINER—A device designed to lock the valve-spring retainer to the valve stem.

VALVE ROTATOR—A mechanical device locked to the end of the valve stem (used in place of a valve spring retainer) that forces the valve to rotate about 5° with each rocker arm action.

VALVE SEAT—The surface, normally curved, against which the valve disk's operating face comes to rest to provide a seal against leakage of liquid, gas, or vapor.

VALVE SEAT INSERT—A metal ring inserted into the valve seat, made of special metal that can withstand engine operating temperatures.

VALVE SPRING—The compression-type spring that closes the valve when the valve-operating cam assumes a closed-valve position.

VAPORIZATION—A change of state from liquid to vapor gas, by evaporation or boiling; a general term including both evaporation and boiling.

VAPOR LOCK—A condition in the fuel system in which gasoline vaporizes in the fuel line or fuel pump; bubbles of gasoline vapor restrict or prevent fuel delivery to the carburetor.

VARIABLE SPEED FAN—An engine fan that will not exceed a predetermined speed or will rotate only as fast as required to prevent engine overheating.

VENTURI—In the carburetor, a narrowed passageway or restriction that increases the velocity of air moving through it, produces the vacuum responsible for the discharge of fuel from the fuel nozzle.

VIBRATION—An unceasing back and forth movement over the same path; often with reference to the rapid succession of motions of parts of an elastic body.

VIBRATION DAMPER—A weighted device that is attached to the engine crankshaft at the end opposite its power output. Its purpose is to absorb engine vibration.

VISCOSITY—The resistance to flow exhibited by a liquid. A thick oil has a greater viscosity than a thin oil.

VOLATILITY—A measure of the ease with which a liquid vaporizes. Volatility has a direct relationship to the flammability of a fuel.

VOLUME—The amount of air in the combustion space of an engine cylinder.

VOLUMETRIC EFFICIENCY—The ratio between the amount of air-fuel mixture that actually enters an engine cylinder and the amount that could enter under ideal conditions.

V-TYPE ENGINE—An engine with two banks of cylinders set at an angle to each other in the shape of a V.

WASTE GATE—A control device on a turbocharger to limit boost pressure, thereby preventing engine and turbocharger damage.

WATER JACKETS—The spaces between the inner and outer shells of the cylinder block and head through which coolant circulates.

WATER PUMP—In the cooling system, the device that circulates coolant between the engine water jackets and the radiator.

WORK—The result of a force acting against opposition to produce motion. It is measure in terms of the product of the force and the distance it acts.

APPENDIX II

ANSWER KEY

CHAPTER 1 - TECHNICAL ADMINISTRATION

MAINTENANCE ADMINISTRATION

Q1. maintenance supervisor

Q2. 40 working days

Q3. P-300

Q4. one

Q5. indirect labor

MAINTENANCE SUPPORT

Q6. H level

Q7. 1250-2

Q8. 24 hours

Q9. PM groups

Q10. maintenance supervisor

CHAPTER 2 - PRINCIPLES OF AN INTERNAL COMBUSTION ENGINE

INTERNAL COMBUSTION ENGINE

Q1. rotary motion

Q2. fuel, air, ignition

Q3. four (cylinder, piston, connecting rod, and crankshaft)

Q4. scavenging

CLASSIFICATION OF ENGINES

Q6. fuel, lubrication, electrical, cooling, and exhaust systems

Q7. horizontal opposed

Q8. 180°

Q9. I-head

Q10. F-head

ENGINE MEASUREMENTS AND PERFORMANCE

Q11. one foot

Q12. prony brake

Q13. friction

Q14. mechanical efficiency

Q15. liters

CHAPTER 3 - CONSTRUCTION OF AN INTERNAL COMBUSTION ENGINE

ENGINE CONSTRUCTION

Q1. cylinder sleeves or liners

Q2. wet- and dry-type

Q3. cup and disk

Q4. crankcase

Q5. scavenging

Q6. manifold heat control valve

Q7. synthetic rubber and wick

Q8. head, skirt, ring grooves, and lands

Q9. anchored, semi-floating, full-floating

Q1O. provide a seal between piston and cylinder wall, contains lubricating oil, and provides a solid bridge to conduct heat from piston to cylinder wall

Q11. crankshaft

Q12. camshaft, followers, pushrods, and rocker arms

Q13. mushroom, semi-tulip, and tulip

Q14. stellite

Q15. umbrella and O ring

ENGINE ADJUSTMENTS AND TEST

Q16. spring squareness, spring free height, and spring tension

Q17. normal operating temperature

Q18. piston rings and cylinders may be worn and leaking pressure

Q19. incorrect timing

Q20. leaking intake valves

CHAPTER 4 - GASOLINE FUEL SYSTEMS

GASOLINE FUEL SYSTEM

Q1. antiknock

Q2. octane rating

Q3. fuel neck restrictor

Q4. wet- and dry-type

PRINCIPLES OF CARBURETION

Q5. float, idle, off-idle, acceleration, high speed, full power, choke

Q6. float

Q7. throttle return dashpot

Q8. manifold pressure sensor (MAP)

GASOLINE FUEL INJECTION

Q9. timed injection

Q10. crankshaft postion sensor

Q11. throttle positioner

EXHAUST AND EMISSIONS CONTROL SYSTEMS

Q12. hydrocarbons, carbon monoxide, and oxides of nitrogen

Q13. platinum and palladium

Q14. monolithic

Q15. coolant temperature switch

CHAPTER 5 - DIESEL FUEL SYSTEMS

DIESEL FUEL SYSTEM

Q1. 2D

Q2. pour point

Q3. cleaniness

Q4. spherical

Q5. ischronous

Q6. electronic governor

Q7. hydraulic power piston

Q8. six

Q9. 2 to 2 1/2 inches

METHODS OF INJECTION

Q10. meter, inject, time, atomize, and create pressure

Q11. 9 gallons per minute

Q12. front end of the engine camshaft

Q13. low side of the injection pump housing

Q14. drive shaft, distributor rotor, transfer pump

Q15. maximum outward travel of the plungers

Q16. spring-loaded ballcheck return fitting

Q17. 65 to 75 psi

Q18. unit type

Q19. one

Q20. AFC device

Q21. PT pump is not timed to the engine

Q22. oil temperature sensor

Q23. 140 psi

Q24. control valve

Q25. multifuel

Q26. fuel density compensator

SUPERCHARGERS AND TURBOCHARGERS

Q27. intercooler

Q28. sealing rings

COLD **WEATHER STARTING AIDS**

Q29. manifold flame heater

Q30. extreme emergencies

DIESEL FUEL SYSTEM MAINTENANCE

Q31. daily

Q32. clean work area

GENERAL TROUBLESHOOTING

Q33. 3 to 5 minutes

Q34. blue

Q35. push down and hold the injector follower with a large screwdriver

CHAPTER 6 - COOLING AND LUBRICATING SYSTEM

COOLING SYSTEMS

Q1. air-cooled

Q2. radiator

Q3. downflow and crossflow

Q4. bottom of the cap

Q5. thermostatic

Q6. thermostat

Q7. 50/50

Q8. fast, reversing, and chemical

Q9. hydrometer and refractometer

Q10. hand-operated air pump

LUBRICATING SYSTEM

Q11. viscometer

Q12. by the letter W (10W30)

Q13. American Petroleum Institue (API)

Q14. SG

Q15. full-flow and bypass

Q16. splash, combination splash and force-feed, force-feed, and full force-feed

Q17. splash

Q18. full forced-feed

Q19. micrometer and small hole gauge

APPENDIX III

REFERENCES USED TO DEVELOP THIS TRAMAN

NOTE: The following references were current at the time this TRAMAN was published, but you should be sure you have the current editions.

1988 C-K Pick-Up Truck Service Manual, Chevrolet Motor Division, General Motors Corporation, Detroit, MI, 1986.

1989 Medium/Heavy-Duty Truck, Shop Manual, Ford Motor Company, Dearborn, MI, 1988.

Brady, Robert N., *Diesel Fuel Systems,* Prentice-Hall Inc., Englewood Cliffs, NJ, 1981.

Brady, Robert N., *Heavy-Duty Truck Fuel Systems,* Prentice-Hall Inc., Englewood Cliffs, NJ, 1991.

Duffy, James E., *Modern Automotive Mechanics,* Goodheart-Willcox Company Inc., South Holland, IL, 1990.

Duffy, James E., *Modern Automotive Technology,* Goodheart-Willcox Company Inc., South Holland, IL, 1994.

Engineman Fundamentals, NAVEDTRA 12170, Naval Education and Training Professional Development and Technology Center, Pensacola, FL, 1996.

Equipment Operator; Basic, NAVEDTRA 12535, Naval Education and Training Professional Development and Technology Center, Pensacola, FL, 1994.

Management of Civil Engineering Support Equipment, NAVFAC P-300, Naval Facilities Engineering Command, Alexandria, VA, 1997.

NMCB Equipment Management, COMSECOND/COMTHIRDNCBINST 11200.1, Commander, Second Naval Construction Brigade and Commander, Third Naval Construction Brigade, Norfolk, VA and Pearl Harbor, HI, 1994.

Principles of Automotive Vehicles, TM 9-8000, Department of the Army, Washington, DC, 1988.

INDEX

D

E

F

G